

IN THE CLAIMS:

Please cancel Claim 35 without prejudice or disclaimer of the subject matter presented therein.

Please amend Claims 3 and 7 to read as follows. For the Examiner's convenience, a copy of all the pending claims are presented below. A marked-up version of the amended claims, showing the changes made thereto, is also attached.

1. (Not Currently Amended) An image pickup device comprising:
a color filter array that includes color filters arranged in horizontal and vertical directions;
and an image pickup element for picking up an image of an object through said color filter array, wherein
said color filter array comprises color filter groups of a plurality of units, in which each unit comprises first to eighth color filter groups and each color filter group represents a column comprises an array of the color filters,
the first color filter group comprises an alternate array of first and second color filters,
the second color filter group comprises an alternate array of third and fourth color filters,
the third color filter group comprises an alternate array of the second and first color filters,
the fourth color filter group comprises an alternate array of the fourth and third color filters,
the fifth color filter group is arranged in a same manner as the third

color filter group,

the sixth color filter group is arranged in a same manner as the second color filter group,

the seventh color filter group is arranged in a same manner as the first color filter group, and

the eighth color filter group is arranged in a same manner as the fourth color filter group.

2. (Not Currently Amended) An image pickup device according to claim 1, wherein the first to fourth color filters are of yellow, cyan, magenta and green.

sub 71 3. (Three Times Amended) An image pickup device comprising:
a color filter array comprising color filters arranged in horizontal and vertical directions;
a plurality of pixels including photoelectric converting elements arranged in the horizontal and vertical directions, respectively corresponding to the color filters;
a plurality of vertical read-out units provided for a plurality of pixels arranged in the vertical direction, said plurality of vertical read-out units being arranged to read out signals from the plurality of pixels arranged in the vertical direction;
a horizontal read-out unit arranged to read out sequentially the signals from said plurality of vertical read-out units in the horizontal direction;
an output unit arranged to output sequentially the signals from said horizontal read-out unit; and

31
a control unit arranged to divide the plurality of pixels on a unit basis of a predetermined number of lines, which includes a plurality of first lines alternating with a plurality of second lines, and arranged to add the signals of pixels of adjacent first lines and second lines to generate a color difference signal from every unit, wherein the color difference signals generated from adjacent units are different, and the color difference signals generated from every other unit are equal.

4. (Not Currently Amended) An image pickup device comprising an image pickup element for picking up an image of an object, said image pickup device comprising:

a color filter array that includes color filters arranged in horizontal and vertical directions, through which an image of an object is picked up by the image pickup element;

a plurality of pixels constituting photoelectric converting elements arranged in the horizontal and vertical directions, respectively corresponding to the color filters;

a plurality of vertical charge transfer units provided respectively corresponding to columns of the plurality of pixels in the vertical direction, for transferring electric charges from the plurality of pixels in the vertical direction;

a horizontal charge transfer unit connected to ends of said plurality of vertical charge transfer units, for transferring the electric charges, transferred from said plurality of vertical charge transfer units, in the horizontal direction;

an output unit for converting the electrical charges transferred from

said horizontal charge transfer unit into an image signal and outputting the image signal,
wherein

said color filter array comprises an array, in the vertical direction, of
a plurality of units of color filter groups, with each unit comprised of 8 rows in which an
odd-numbered row includes an alternate array of a first color filter and a second color filter
in a predetermined order while an even-numbered row includes an alternate array of a third
color filter and a fourth color filter in a predetermined order, and

an image signal corresponding to one row, within an image signal
obtained from the image pickup element in a single image pickup operation, is outputted as
a line-sequential color difference signal of pixels of 4 rows in the vertical direction,
wherein:

a color filter at a $(4n+1)$ th row and an odd-numbered column is same
as a color filter at a $(4n+3)$ th row and an even-numbered column,

a color filter at a $(4n+2)$ th row and an odd-numbered column is same
as a color filter at a $(4n+4)$ th row and an even-numbered column,

a color filter at a $(4n+1)$ th row and an even-numbered column is
same as a color filter at a $(4n+3)$ th row and an odd-numbered column,

a color filter at a $(4n+2)$ th row and an even-numbered column is
same as a color filter at a $(4n+4)$ th row and an odd-numbered column, and

n is an integer equal to or larger than 0.

5. (Not Currently Amended) An image pickup device according to claim 3, wherein signal charges of two predetermined pixels that are mutually adjacent in the vertical direction, among the plurality of pixels arranged corresponding to the color filters, are added and an image signal corresponding to the added signal charges is outputted from said output unit.

6. (Not Currently Amended) An image pickup device according to claim 4, wherein signal charges of two predetermined pixels that are mutually adjacent in the vertical direction, among said plurality of pixels corresponding to the color filters, are added and an image signal corresponding to the added signal charges is outputted from said output unit.

7. (Twice Amended) An image pickup device according to claim 5, wherein the added signal charges of the two predetermined pixels are further added with signal charges of two predetermined pixels that are present in a direction diagonal to the first-mentioned two predetermined pixels in a column adjacent to that of the first-mentioned two predetermined pixels, and an image signal corresponding to the added signal charges of the four predetermined pixels is outputted from said output unit.

8. (Not Currently Amended) An image pickup device according to claim 6, wherein

the added signal charges of the two predetermined pixels are further added with signal charges of two predetermined pixels that are present in a direction diagonal to the first-mentioned two predetermined pixels in a column adjacent to that of the first-mentioned two predetermined pixels, and

an image signal corresponding to the added signal charges of the four predetermined pixels is outputted from said output unit.

9. (Not Currently Amended) An image pickup device according to claim 7, wherein an image signal corresponding to signal charges is outputted from said output unit by combining a method of adding the signal charges in the vertical direction and in the diagonal direction and a method of further adding, to the signal charges added in the vertical direction, signal charges in the vertical direction.

10. (Not Currently Amended) An image pickup device according to claim 8, wherein an image signal corresponding to the signal charges is outputted from said output unit by combining a method of adding signal charges in the vertical direction and in the diagonal direction and a method of further adding, to the signal charges added in the vertical direction, signal charges in the vertical direction.

13. (Not Currently Amended) An image pickup device according to claim 5, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

14. (Not Currently Amended) An image pickup device according to claim 6, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

15. (Not Currently Amended) An image pickup device according to claim 7, wherein the color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

16. (Not Currently Amended) An image pickup device according to claim 8, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

17. (Not Currently Amended) An image pickup device according to claim 9, wherein the color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

18. (Not Currently Amended) An image pickup device according to claim 10, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

19. (Not Currently Amended) An image pickup device according to claim 3, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the pixels to said plurality of vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

20. (Not Currently Amended) An image pickup device according to claim 4, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

21. (Not Currently Amended) An image pickup device according to claim 5, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

22. (Not Currently Amended) An image pickup device according to claim 6, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

23. (Not Currently Amended) An image pickup device according to claim 7, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

24. (Not Currently Amended) An image pickup device according to claim 8, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

25. (Not Currently Amended) An image pickup device according to claim 9, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

26. (Not Currently Amended) An image pickup device according to claim 10, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

29. (Not Currently Amended) An image pickup device according to claim 13, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

30. (Not Currently Amended) An image pickup device according to claim 14, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

31. (Not Currently Amended) An image pickup device according to claim 15, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

32. (Not Currently Amended) An image pickup device according to claim 16, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

33. (Not Currently Amended) An image pickup device according to claim 17, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

34. (Not Currently Amended) An image pickup device according to claim 18, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from said pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

36. (Not Currently Amended) An image pickup device according to Claim 3, further comprising:

a signal processing unit, which subjects the signals outputted from said output unit to an image processing; and

an image display unit, which displays image information from said signal processing unit.

REMARKS

This application has been reviewed in light of the Office Action dated October 22, 2002. Claims 1-10, 13-26, 29-34, and 36 are pending in this application, with Claims 1, 2, 4, 6, 8, 10, 14, 16, 18, 20, 22, 24, 26, 30, 32, and 34 having been allowed, wherein Claims 1 and 4 are in independent form. The rejected claims are independent Claim 3 and all of the claims which depend therefrom. In this regard, Claims 3 and 7 have been amended to define still more clearly what Applicants regard as their invention. Claim 35 has been cancelled without prejudice or disclaimer of the subject matter presented therein. Favorable reconsideration is requested.

Claim 3 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. In response, Applicants have amended the last clause of Claim 3 to read as follows: "a control unit arranged to divide the plurality of pixels on a unit basis of a predetermined number of lines, which includes a plurality of first lines alternating with a plurality of second lines, and arranged to add the signals of pixels of